"A gold mine lands its owner in the poorhouse; with a silver mine he can make a decent living; a copper mine will make him rich."

COPPER

By PETER HILTEN

LET us assume the following appalling catastrophe to have taken place:

Last night, while the earth was traveling at its customary speed of some 100,000 miles per hour around the sun, it was struck for a single instant by a mysterious power roaming the universe. The only effect this power had upon the earth was to transform all of the element "Cu," atomic number 29, atomic weight 63.57, into red sealing wax. In other words, all the copper on earth had ceased to be a metal.

In a single second, our civilization collapsed. Michael Faraday and Werner von Siemens had lived in vain. All the world's means of communication except those relying on human or animal force stood still. Electric locomotives stopped in the dark with their trains. The copper fireboxes of steam locomotives had burst in huge explosions, the overhead lines had come smacking down between the rails, the telegraph wires lay in red wax strands beside the permanent way. No streetcar was moving. There was a weird silence all over the world. All electric lights had gone out, no telephone could be used, all the cables on the ground and at the bottom of the sea had become useless, no automobile, no plane, no motorboat moved. The antennae of transmitters and receivers, strings of red wax, had fallen to the ground or on the roofs. Dynamos and electric motors stood cold; copper roofs slid in red wax cascades from housetops and towers; wooden ships lost their copper bottoms under water, the copper nails holding together the ribs and decks of the vessels gave way and the ships burst asunder; on steamers there were raging explosions; door knobs fell off; brewery vats and all electric appliances in the home no longer served their purpose; copper utensils as well as monuments were destroyed; all objects made of copper alloys, of bronze and brass, were demolished; watches stopped ticking. Although the rhythm of day and night, of sowing and harvest, had not been disrupted, time stood still. The bells in the steeples dropped from their bell cages, ships' screws floated on the water together with other things turned into wax, cigarette cases, lipstick holders, bathroom fixtures, everything had turned into wax or an ugly brittle or soft mass. No machine could be used—all bronze bearings were destroyed. But what was worst: all towns, villages, and hamlets were cut off from each other, the nerves of the world were dead.

Assuming that this catastrophe had happened, it would mean that humanity was thrown back not only to the time before the age of electricity, but to early prehistoric times.

FROM AGRICOLA TO BROADWAY

Georg Bauer, who called himself Agricola, was the first modern mining engineer in the world. Almost four hundred years ago he taught people how to dig up the treasures of the earth and how to turn the ores dug up into metal. He had never heard of the valley called Wadi-Meghara, of the place Sarb-el-Chad and Wadi-Nash, where Pharaoh Snefru had copper mines 5000 years B.C. He knew nothing of Coro-Coro, Utah, Montana, and very little about New Amsterdam, a town far off on a continent discovered by a man called Columbus. If a great prophet had told Agricola that this little Dutch settlement would one day be known as New York and dictate prices to a Europe whose copper sources were exhausted, he would only have smiled incredulously.

If this Agricola were to rise from the dead today, he would seek in vain for his six-foot smelting oven with its hand bellows. Instead he would hear the hissing of one of the Anaconda mines' three-hundred-ton copper converters, would descend into the pit of one of the Montana copper mines with its three hundred miles of galleries, and then be whizzed up by an express lift to the fiftieth floor of the Anaconda administration building on Broadway. There, facing the city of copper scandals, of Standard Oil, Morgan, Rockefeller, and Vanderbilt, he would fall on his knees, hide his face, and implore the powers of divinity to let him return to dust, but dust without metal, oil, or coal.

Fifty years ago, the smelting of copper was still a heart-breaking affair. At 1,300 degrees centigrade the ore released the red metal, which dripped down to the bottom of the small shaft-furnace in white-hot rivulets. If the supply of air was not maintained at the correct level, the furnace cooled off, the molten metal congealed, and at 900 degrees the furnace froze hard and had to be knocked down to break out the "bear."

Copper ores are to be found all over the world, a lot here, a little there. In Germany there has been a miners' union working the copper slate of Mansfeld since 1199. The first

steam engine in Germany ran in the Mansfeld region, the high school of representative mining methods. Besides Mansfeld, copper was mined in Europe in Rio Tinto in Spain and in Falun in Sweden. King Gustavus Adolphus's battles for Protestantism on German soil were fought with Swedish blood and with ore from the mines of Falun. It was from the three-thousand-year-old Rio Tinto mines that the Phoenicians fetched their copper. They were followed by the Carthaginians and, centuries later, the Romans. After the decline of Rome, the Goths went down into the shafts and did more damage than they produced ore. The Caliphs came, then Ferdinand and Isabella. Rio Tinto became the property of the Crown. The copper within the country was better than the cursed gold the conquistadors extorted from the Indians. In Swansea in Wales there were copper furnaces; they flourished throughout the centuries until haughty presumption blinded the smelting masters of Swansea and brought disaster upon them.

GOLD, SILVER, AND DESERTS

One evening in May 1864, two adventurers in search of easy riches discovered a five-foot hole in Montana which some unknown, disappointed treasure hunter had presumably abandoned. The hole was an abandoned claim, and the two men were looking for gold.

They found gold. They were more experienced than their unknown predecessor. In accordance with the law, they staked off an area of 600 by 1,500 feet and registered their claim. The registration did not cost anything. The possession of a claim obliges the owner to do at least a hundred dollars' worth of work every year on each claim. After five years the ground becomes his property.

The two men worked hard. But gradually whole swarms of gold and silver prospectors arrived with mules and provisions, with picks, spades, and wash pans. There was less and less gold. But instead, silver was discovered at greater depths. For a number of years everything was fine. Indeed, at one time the men made more money on silver than on gold. But then the silver exchange on Wall Street collapsed, and rumors of unheard-of gold discoveries came from California and Arizona.

East of Los Angeles there stretches the Mohave Desert, one of the worst spots on the face of the earth. On the other side of the Colorado River, in Arizona, the same desert continues and is known as the Gila Desert. Further east the desert is transformed into a landscape of the moon with jagged points reaching up to 8,000 feet. There is no trace of plant life, and the heat is enough to roast your brain. The glare gives you red eyelids, and the lakes are alkaline or salt.

While the men in Montana were digging for silver after ten years of washing gold, the gold rush to this desolate spot in California and Arizona began in 1874. Men who had been considering whether to kill someone for a little sack of tobacco yesterday were millionaires today. The bonanza period began. The bonanza men built palaces in Frisco in the bonanza style. Gold, everything was made of gold, down to the spittoons. The town of Skioor grew up from the dry, dusty ground. Gold dust floated in the whisky puddles on the bars of its countless saloons, gold dust was the means of payment, gold dust trickled into the hands of the girls. Today this city, which once had 80,000 inhabitants, is a dilapidated empty shell housing swarms of rats. Until a few years ago there were still a couple of hundred people there looking for gold: the gold that had seeped through the floor cracks of the saloons and banks!

NEW AGE

At the very time that things were going from bad to worse in Montana and Arizona, a few daft men in Europe were making an experiment which might have saved many gold and silver mines if their owners had had any faith left. But since gold had proved such a disappointment, how could they be expected to place their faith in electricity and copper? Of course, there had always been some copper, too, in the gold and silver mines. Dirty, worthless copper. In the region of Lake Superior there was even pure copper. But who cared about that? And now there were those people in Europe making an experiment which seemed to have succeeded and declaring that a new age had dawned. The result was that some cunning foxes from Wall Street made ostensible pleasure jaunts to Montana and Arizona and took possession of old, abandoned mines, just as less cunning foxes had done before them. Often they bought an exhausted mine for the price of a railway ticket to Frisco or New Orleans. Perhaps there was something to be done in Mexico or Honduras, said the old prospectors. Gold, of course. What, work for copper? Nonsense.

The second Copper Age had dawned.

The dawning of the first Copper Age may have been something like this. At the height of the second Stone Age, about 7000 B.C., one of our ancestors, a great scientist of his time, must have discovered a red stone. When he attempted to treat it according to the usual methods employed in preparing a flint, he found that the red stone would not splinter. Instead, it yielded under the blows of his stone hammer, and he discovered that he could give the red stuff almost any shape he desired. We can imagine the pride this engineer of the Stone Age took in his new-fashioned spear points or daggers, and how his cave companions laughed at him. But their laughter will have ceased when the learned man proved the superiority

of his material over flint and firestone. Then they probably killed him right away.

THEY RAISED THEIR HATS

The second Copper Age began at 9 p.m. on September 15, 1882. In that hour, copper rose to second place among the metals behind iron. Among those present were the German engineer Oskar von Miller, Professor Deprez of Paris, a few Bavarian telegraph engineers, and the committee of the first Electrotechnical Exhibition of Germany in Munich, all in frock coats and high hats. Furthermore, there was an electromotor of 2 horsepower, a water pump, a little artificial waterfall, and a few genuine fir trees from the environments of Munich. The public was excluded, for how was one to know whether it would work ?

At the afore-mentioned hour, in the town of Miesbach in Upper Bavaria, a tiny steam engine coupled to a dynamo was set in motion, and the dynamo began to dispatch the unheard-of tension of 1,400 to 2,000 volts over a specially built telegraph line to Munich, fifty-seven kilometers away. There the energy produced in Miesbach flashed into the electromotor, which passed on its revolutions to the water pump, which in turn began to copy nature by pumping a clear stream of water to the top of the waterfall whence it cascaded prettily down two meters to the pool at the bottom again.

The witnesses raised their hats and mopped their damp brows. They greeted the new age, which they called not the second Copper Age but simply the Age of Electricity. Then, with full hearts and stiff shirt fronts, they turned to the table with the champagne.

Copper had begun its service. The world called for copper! This happened long after those two adventurers in Montana had moved on west. But over the 150-foot hole they had left, the Anaconda Copper Mining Co., Montana, was founded, which was to become the greatest copper-mining concern in the world. Its offices were at 42 Broadway, New York, and its manager was John D. Ryan. Two Rockefellers, sons of the best-hated man in the States, became members of the board. But only secretly. The man who appeared in public was John D. Ryan. A few steps away, at 49 Wall Street, Senator William A. Clark had his office. He was proud of his title, and the Rockefellers knew this. His Honor the Senator bought up claims in hot Arizona, in what was known as the Verde district, almost 2,000 miles south of the Anaconda mine. There one of his geologists had discovered a mine containing copper ore, and enough gold in this copper ore to cover the costs of mining the copper for many years. The gold alone was enough to cover all expenses.

DIVIDENDS

On the craziest triangle in the world, on Manhattan, in Wall Street and Lower Broadway, copper prices are fixed twice a day: Anaconda Copper . . . Calumet & Hecla . . . Boston & Montana . . . Greene Consolidated . . . North Butte . . . United Verde . . .

Prices rose, Europe could no longer cover all its own copper requirements which had for centuries been supplied from the Spanish Rio Tinto mines, the English mines of Swansea and Cornwall, the German copper slate of Mansfeld, and many other small and tiny mines.

Senator Clark called his copper United Verde. It became the most notorious copper mine in the world. For years no dividends were paid; the Senator was building. Then suddenly there was a clear profit of $5,435,970 available for distribution in a single year.

At 42 Broadway, Mr. Ryan was tearing out his hair, he was having so much trouble with his Anaconda. Seven years after Ryan had driven his company to the verge of bankruptcy the Anaconda Copper Mining Co., Montana, began to pay dividends. In the ten years from 1895 to 1905, 21 million dollars were paid out in dividends. But business was not yet quite all it should be. Mr. Ryan decided to go to extraordinary expense and to raise his Anaconda Copper Mining Co. to the highest possible level of engineering. He built a regular copper town—of which he barely knew the quickest route of getting there and, for Pete's sake, of getting away again—and dug up a dividend of 5 million dollars out of the soil of Montana in one year. As if that were not enough to make the Hon. Senator Clark envious!

In the ensuing years, Ryan drove up the net profit of the Anaconda mines to 6, 10, and finally 12 million dollars. The world was not getting enough copper! But it was not only the Anaconda people who were causing Senator Clark sleepless nights. There are some 350 copper mines in the world producing at least 50,000 kilograms each per annum. The largest of these mines has an annual output of more than 150 million kilograms of copper ore. The geologists of these mines are traveling about, year in and year out, in search of new deposits.

HELL BELOW

The ore of United Verde contains on an average 20 per cent sulphur.

There are not many people in the world whom one can question about United Verde. The workmen and employees are bound to secrecy. A narrow-gauge railway leads through desolate country to Yavapai. The ground under the rails sometimes gives way, then the train falls over. To travel on foot or on horse- or muleback is impossible—there is no water. There are stories about golddiggers dying of thirst who, already out of their minds, found water, drank it greedily, and appeared a few hours later before God's throne. The water contains arsenic.

Diamond drills have found copper ore as far

down as 2,000 feet. The total deposit has been estimated at 20 million tons of ore, containing 6 per cent of pure copper.

The management of the mine fills up old galleries with loose rubble and drives new galleries right next to the old ones. This method of mining is dangerous, and the timbers give way sometimes. Then . . . .

There is too much timber in the mine, and at some places the rock contains 32 per cent sulphur. The heat below is murderous, and the sulphur is inclined to self-combustion. There are fire guards in every gallery. There is water, too, not much, but still. . . . A fire can seldom be extinguished; it is simply walled up with cement. But that is not the end yet. The rock is very porous. And since it is impossible to work in any mine without a lot of air being pumped down—not even at United Verde—the air still penetrates to the burning sulphur, and the fire smolders on. It is amazing how little air a sulphur fire needs. There are quite a few such fires at United Verde which have been burning for years.

In August 1902 another fire broke out. After an hour the men had to leave the mine. Those who were still able to. The mine was modern, but not modern enough to be able to bring up 500 men in half an hour. Sulphur vapors filled all the shafts and galleries. Sulphur vapors are used for ridding ships of rats. Well, in this case it wasn't rats.

Months later the fire was extinguished with carbon dioxide. Only the fire at the 400-foot level did not go out. It had been burning since 1897, and by 1907 it reached the 700-foot level. There are some galleries in which the hot sulphur vapor blows into your face from cracks in the walls. The sulphur vapor does not harm the copper; on the contrary, it almost saves the roasting process which otherwise takes place above ground under the sun and stars.

There are also big caves at United Verde, as big as cathedrals. Sometimes they collapse. One such cave once collapsed and swallowed up the administration building of the mine.

All attempts to make the mine safer failed. As in all other copper mines, the timbers in United Verde are crusted with cement, as a fire protection. It doesn't help much. In addition, the wood is corroded by acid-bearing water, and the loose rock snaps the timbers like toothpicks. Iron? Steel? Can't be used. I already said that the water contains acids. Iron would be eaten away.

When the old fire reached the 700-foot level, there was an explosion. Five dead. Immediately after that, one of those caves collapsed, and the air pressure swept through the galleries. The bulkheads broke and came hurtling along the galleries like projectiles in gun barrels. Hardly had this passed over when water roared onto the old fire. Like thunderclaps the steam explosions followed one upon the other. Under the pressure of the mountain, timbers were shot against the opposite walls; walled-up fire partitions came flying and burst into pieces. Fire, steam, and caustic sulphur, a truly hellish mixture threatened the miners. They found themselves in an artificial volcano.

The acid water corrodes the skin. There is also a worm you get at United Verde, a hookworm. Curiously enough, this worm prefers to live in a miner rather than, for example, in a locomotive driver. Of course, there are also the usual mining accidents at United Verde, only that they occur more frequently, as the men there are more nervous than elsewhere.

Then there is the dynamite. Not that in this underworld with raging compressed-air rock drills rattling like machine guns, that in this hell of pressure lines, sulphur vapors, acid water, break-throughs, and blastings the explosive itself is dangerous. Oh no! Those nice, greasy dynamite packages which have such a pleasant bitter-almond smell are harmless. Only those that have been forgotten in the drill holes!

The drilling machines start off with a roar. The rock dust ruins your lungs, and the drills quickly get dull. A blow of the hammer: the dull point comes flying out and is replaced by a sharp one—the work goes on. The old drills are sent up to be sharpened. On the way up they may drop into an ore wagon and pass on into the rock crushers. There are rock crushers which can squash rocks the size of large beer barrels. So it may happen, indeed, it happens quite often, that a five-foot steel drill comes whining out of the crusher and is shot through the roof. The people outside are usually not prepared for drills falling from the sky. But all this only by way of parenthesis.

The charges have been distributed in the drill holes, the fuses are burning, little sparks flit across the stony ground, climb up, hissing and flashing, and disappear. . . . The men have taken cover. The mountain shakes! Wham . . . roars, thuds, and crashes. . . . Incidentally, dynamite gases are poisonous, they must be given time to blow away. But now the drama begins: the returned crew looks for dynamite sticks that have not gone off. It may have happened that there was something wrong with one of the fuses. You can't tell from the looks of the new hole that the devil is waiting in it. The unexploded stick may also be lying among the broken rock; it cannot be seen under its coating of dust. The men start their drills again, others begin to swing their picks to remove the broken rock. Nothing has been found, every crack and corner was carefully investigated with torchlights. But suddenly. . . .

Then they bring up the dead.

That is United Verde.

FIENDS ABOVE

The struggle above ground looks different. Do you know what an apex is? No? Well, when a dentist drills and drills and keeps on drilling, till he has drilled a hole into your collar stud, he reached and passed the apex when he advanced from your tooth into the gum. In American mining language, apex stands for the boundary of a claim, i.e., below ground the point where you hit upon your neighbor's claim.

Could the management of Anaconda, when it pushed a gallery in the direction of the claim of its neighbor Mr. Heinze, keep on going ahead or did it have to stop at the apex? It could keep on going, provided the vein of ore did not stop. But Mr. Heinze was also pushing out a gallery and, since he was on excellent terms with the judges in the state of Montana and did not hesitate to buy up whole newspapers to rouse public opinion against the Anaconda crowd, he was able to obtain a judgment which, footing on the apex law, forced the Anaconda Copper Co. to suspend operations. Overnight, the Rockefellers paid this Mr. Heinze twelve million dollars, and Heinze retired.

This was the struggle above ground, not exactly above the mines themselves but several thousand miles away in that triangle called Manhattan. From then on the lives of their miners were worth as little to the mining concerns as the lives of locomotive drivers, stokers, and passengers had been in the old days to the first Rockefeller. If they wanted a mine, they needed only to set fire to it. Or. . . .

After they had got rid of Mr. Heinze, the Anaconda crowd went to work to rob Senator Clark of his title. And one morning Senator Clark woke up as plain Mr. Clark. He smiled ruefully and went to make a call on Mr. Ryan and the Rockefellers. The result was that he was graciously accepted in the bosom of the great family which was now called Amalgamated Copper and lived in the shelter of the Standard Oil Co.

Amalgamated wanted to buy the Calumet & Hecla mines. Calumet & Hecla was not interested. Why should they be? They had the best copper and were doing very nicely. So the Calumet & Hecla people would not sell. Then five fires broke out, one after the other, in their mines on Lake Superior. But not only at Calumet & Hecla—at other mines too. There was no longer a single copper mine without private detectives in its shafts. All visitors were excluded. The Calumet & Hecla people were scared stiff by the fire threat and took every possible precaution. They soaked the timbers in the mine in a zinc chloride solution, sprayed water into the shafts, which they had to pump out again, guarded the water mains, slept on the hydrants, wrapped fire hoses around their bodies, had chemical extinguishers built in, put in the best electrical alarm system with telephones, sirens, light signals, and bells, constructed shafts in such a way as to permit traffic like on a street. And then the fire broke out. It was the sixth great fire. Curiously enough on a Saturday, when there was hardly anybody below ground.

It was an obvious case of incendiarism. The fire burned for three weeks. The shafts were covered up, and it was finally smothered. Calumet & Hecla would not sell. Then small fires broke out everywhere. They gnawed at the nerves of the owners. But they would not sell. Suddenly the trouble stopped. The men at 42 Broadway had arrived at the conclusion that all the efforts made for Calumet & Hecla were in vain.

SMELTERS' END

But that was only the beginning of the fights for copper. Even in Europe there was a fight for copper.

Less than a generation earlier, the United States had been purely a raw-material country. Together with Bolivia and Chile, the States had practically a copper monopoly. But the American ore had all to be shipped to Europe for smelting in Swansea. The English had learned from Agricola how to smelt copper. The smelters of Swansea regarded themselves as the real masters of copper and acted with incredible shortsightedness. By all kinds of tricks they made deductions from the weight of the ore shipped by the suppliers. They deducted weight for dust, for barren rock, for losses during unloading and transshipment, even for dampness in the ore. They deducted and deducted, until the American mines lost their patience, built their own smelting ovens, and laughed at the stupid smelters of Swansea. Swansea, the copper town, was finished.

America remained the greatest copper supplier of the world.

Speed

In Los Angeles, Reporter Chick Felton arrived with the police at the scene of a murder, noted the corpse, sidled up to the victim's landlady, asked: "Can I rent this apartment?" Said she: "I already rented it to that police sergeant."

Mistake

In Bryn Mawr, Pa., George Baird, returning from a party at 5 a.m., banged at the back door, was greeted with gunfire. Hospitalized, he learned that he had returned to the wrong house in the wrong town.